Public Comment Draft

Health Consultation

Rhodia Incorporated
New Brunswick, Middlesex County, New Jersey
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Public Comment Draft

Prepared By:

Hazardous Site Health Evaluation Program
Consumer and Environmental Health Services
Division of Epidemiology, Environmental and Occupational Health
New Jersey Department of Health and Senior Services

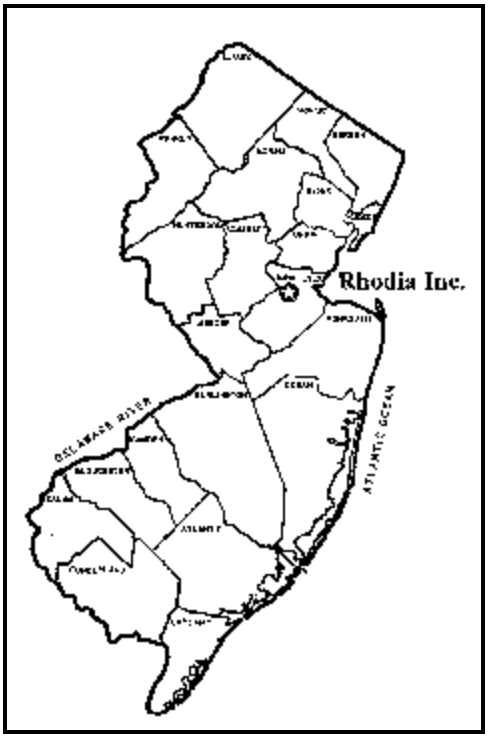
Under Cooperative Agreement with:
The Agency for Toxic Substances and Disease Registry

Statement of Issues

In December 1999, the Edison Wetlands Association, Inc. (EWA) requested that the New Jersey Department of Health and Senior Services (NJDHSS) evaluate a potential public health concern allegedly associated with the Rhodia Incorporated (formerly Rhone-Poulenc, Inc.) site. Rhodia Inc. is a manufacturer of intermediate specialty chemicals used in the formulation of fragrances, cosmetics, and pharmaceuticals. The EWA alleged that discharges and seeps (i.e., free product discharge) from the Rhodia Inc. facility into the Mile Run Brook present a public health hazard to the surrounding community. Subsequent to a site visit conducted in February 2000 by representatives of the EWA, the NJDHSS, and the Agency for Toxic Substances and Disease Registry (ATSDR), the EWA petitioned the ATSDR for the initiation of a Public Health Consultation. The petition was accepted by the ATSDR in June 2000.

As expressed in the EWA's petition to the ATSDR, this Public Health Consultation will serve to evaluate the potential public health implications associated with exposure to environmental media located in publicly accessible areas of the Mile Run Brook. Specifically, samples of soils and surface water of the Mile Run Brook, collected by the EWA, will be evaluated for public health significance.

Background



The Rhodia Inc. site is an active facility, located at 298 Jersey Avenue, New Brunswick, Middlesex County, New Jersey (see inset). Rhodia presently employs about 40 people. Its approximately 15 acre property is situated in a light industrial zoned area. Residential housing is located directly west of the Rhodia Inc. site beginning at about 500 feet distant. A rail line (Amtrak and New Jersey Transit trains) runs along the southeastern boundary of the Rhodia Inc. site. Jersey Avenue forms the northwest boundary of the Rhodia property.

Geographic Information System (GIS) spatial analysis technology, in conjunction with 1990 Census data, was used by the ATSDR in determining that there are approximately 35,000 individuals residing within a one mile radius of the Rhodia Inc. site (see Figure 1). Other companies located in the vicinity of the Rhodia Inc. site include a scrap metal recycling facility, a manufacturer of corrugated boxes, a recycled paper processing facility, a solid waste transfer

station, a chemical company, a plating and battery manufacturer, and a candy manufacturer. Although currently there are no sites in New Brunswick that are on the United States Environmental Protection Agency's (USEPA) National Priorities List (NPL) of Superfund sites, the New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program records indicate that as of 1997, there are approximately 56 known contaminated sites (i.e., soil or groundwater contamination has been confirmed to be above NJDEP standards) in New Brunswick.

Geographically, the site lies within the Triassic Lowlands Physiographic Province of New Jersey. The bedrock in the area consists of alternating layers of reddish brown mudstone, siltstone, shale, and fine grained sandstone of the Passaic (formerly referred to as the Brunswick) Formation. In this formation, groundwater occurs in primary openings such as intergranular pore spaces and in secondary openings such as joints and fractures. Groundwater flow is to the northwest toward the Mile Run Brook. Results of a current well survey indicate that area residents are primarily served by public drinking water supplies although there are at least four active private, potable wells located within a half-mile radius of the Rhodia Inc. site (M. Carnese, URS Corporation, personal communication, 2001).

Mile Run Brook

The Rhodia Inc. site is traversed by the Mile Run Brook, which is about 10 to 15 feet wide and divides the property roughly in half. The Mile Run Brook runs approximately 1,700 feet within the Rhodia Inc. property boundary and flows in a northerly direction, ultimately discharging into the Raritan River about two miles north of the site. The ground surface of the Rhodia Inc. site slopes gently towards the brook. The bank along both sides of the brook is composed of historic fill, the thickness of which varies from approximately zero to 19 feet. During the time of World War I, the area along Mile Run Brook was used for the dumping of ash, garbage, glass, brick, concrete, macadam and sand. Files on the Rhodia Inc. site dating back to the 1980s indicate that stormwater, roof, and parking lot drainage all lead to the Mile Run Brook. Over the years, all but one of the stormwater drains were plugged

Mile Run Brook on Rhodia Inc. site.

with concrete and abandoned. Recently, this last remaining pipe was excavated and the permitted discharge terminated.

Seeps Along the Banks of the Mile Run Brook

The EWA has alleged that sources of contamination to the Mile Run Brook originating from the Rhodia Inc. site included discharges associated with on-site chemical processes, as well as migration of contaminated on-site soils and seeps which act as continuing sources of contamination to surface water. At the August 29, 2000 tour of the site, Rhodia Inc. representatives stated that other than that which is permitted pursuant to New Jersey Pollutant Discharge Elimination System (NJPDES), there are currently no discharges into the Mile Run Brook associated with Rhodia Inc. plant processes.

Site History

The Rhodia Inc. site has a diverse history. Built in 1919 on what was the City of New Brunswick's municipal dump (a municipal incinerator also existed on the site prior to Rhodia Inc. acquiring the property), Rhodia Inc.'s New Brunswick operation was the company's first manufacturing site constructed in the United States. Another chemical manufacturer, E.I. DuPont de Nemours, purchased the Rhodia Inc. site in 1932. (DuPont had purchased sections of the property over a period of time from various owners including Linden Container Company, Sun Oil Company, Acetol Products, Inc., and Newport Chemical Company.) Prior to World War II, a portion of the site was used as a Mack Truck manufacturing operation, and tanks (armored vehicles) were produced at this area during the war. Another area of the site was operated by the Carrier Corporation for the purpose of making machinery (believed to be air conditioners) prior to World War II. Rhodia Inc. repurchased the property from E.I. DuPont de Nemours in 1954.

Rhodia Inc. has manufactured a number of speciality chemicals including ethyl vanillin, cyclamenaldehyde, rhonaldehyde, and coumarin. Rhodia Inc. currently manufactures only coumarin, salicylaldehyde, and acetic acid for use in the formulation of fragrances, cosmetics, and pharmaceuticals (M.J. Emery, Rhodia Inc., personal communication, 2000). Four chemicals that are site specific to Rhodia Inc. operations include camphor, camphene, coumarin, and cumene (a.k.a. isopropylbenzene). Table 1 provides a description for each of these substances referred to as the "four C's." Substances listed on the 1998 Rhodia Inc. chemical survey (pursuant to the New Jersey Worker and Community Right to Know Act) include: acetic acid; acetic anhydride; boric acid; coumarin; fuel oil; methanol; nitrogen; oxygen; paraformaldehyde; phenol; salicylaldehyde; sodium hydroxide; sulfuric acid; and toluene. Both phenol and sulfuric acid are on the USEPA List of Extremely Hazardous Substances (Section 302 of the Emergency Planning and Community Right to Know Act).

Over the years a number of environmental problems (e.g., chemical spills and discharges to

the soil and/or groundwater) were documented at the Rhodia Inc. site. Contaminants included fuel oil, phenol, methacrolein diacetate (a 6,500 gallon spill in 1980), silicone oil, acetic acid, cumene, rhonaldehyde, chem-aqua 4000 (an algacide), and ethyl vanillin (NJDEP undated). Other documented incidents included odor problems (described as chemical, sewer, and a vanilla-like smell) and the improper handling and storage of chemicals.

Throughout the 1980s, the Middlesex County Department of Health issued a number of Notices of Violation to Rhodia Inc. for odors emanating beyond the site's property line. Several community surveys were conducted to identify and document odors originating from site operations and processes. In December 1987, a phenol release resulted in the evacuation of area homes and businesses. Efforts were made by Rhodia Inc. to improve material handling (to minimize the risk of chemical spillage), general housekeeping, equipment operations and maintenance activities, and training of staff. In addition, various production operations were phased out, with several buildings demolished.

In May 1986, Rhodia Inc. entered into an agreement to sell approximately five acres of their property. This triggered an investigation of the entire site in accordance with the Environmental Cleanup Responsibility Act (ECRA) legislation in effect at that time, and subsequently in accordance with the Industrial Site Remediation Act (ISRA) established in 1993. A sampling plan was developed in an effort to determine the potential impact of Rhodia Inc.'s past practices on the environment (O'Brien and Gere Engineers, Inc. 1986). Since this time, the Rhodia Inc. site has remained under investigation by the NJDEP and a number of administrative consent orders (ACOs) have been issued. An ACO issued by the NJDEP identifies procedures regarding the remediation of a contaminated or potentially contaminated site under NJDEP oversight. Consultants hired by Rhodia Inc. have conducted extensive environmental monitoring at the site and have identified a number of "Areas of Concern" regarding the site (Woodword-Clyde Consultants 1991). These "Areas of Concern" included: underground storage tank areas; various spill areas; the storm sewer system; drum storage areas; and deep groundwater. Rhodia Inc. has implemented ongoing remediation throughout the years (fulfilling several but not all of the ACOs) and is currently in its sixth phase of environmental investigation and monitoring.

As part of recent remedial activity, there has been extensive characterization of on-site media. On-site samples of soils on the banks of the Mile Run Brook (November 2000) have shown up to 49,000 ppm of PCBs. Remedial and interim remedial measures have been implemented at the Rhodia Inc. site including: soil excavation, installation of a soil/streambank cover system/geotextile erosion control barrier along portions of the western bank of the Mile Run Brook; installation of a jet grout barrier wall; and installation of a groundwater extraction system.

Community Concerns

On a regular basis since 1995, the New Jersey Community Water Watch (NJCWW), a student chapter of the New Jersey Public Interest Research Group (NJPIRG), has sponsored volunteer trash cleanups of the Mile Run Brook. Additionally, the NJCWW has "streamwalkers" who visually monitor the brook for potential illegal discharges. Concerns about contamination of the Mile Run Brook led the NJCWW to contact the EWA in 1999. The EWA is a non-profit organization which advocates the protection and preservation of the natural resources of Middlesex County. The EWA is also involved with the Raritan River Project which serves to control pollutants entering the Raritan River. Subsequent to NJCWW's request for assistance, the EWA performed limited soil sampling along the banks of the Mile Run Brook immediately adjacent to, and downstream of, the Rhodia Inc. site. Results indicated elevated levels of some metals, polychlorinated biphenyls (PCBs) and several polycyclic aromatic hydrocarbons (PAHs). Camphor was also detected in surface water samples.

In December 1999, the EWA contacted the NJDHSS and requested assistance in determining whether the contaminants found through their sampling (allegedly the result of discharges and seeps from the Rhodia Inc. site into the Mile Run Brook) present a hazard to the health of the surrounding community. The EWA also expressed concern over their perceived lack of progress on remediation activities at the Rhodia Inc. site. In January 2000, the EWA filed an Environmental Rights Act Notice in Middlesex County Superior Court, naming both Rhodia Inc. and the NJDEP. Subsequently, the EWA filed a lawsuit against Rhodia Inc. and the NJDEP on July 5, 2000. According to the EWA, the purpose of this civil action was to: stop alleged discharges into the Mile Run Brook; encourage clean-up of the soil, groundwater, and brook sediment at the site; and pressure the NJDEP to enforce an existing ACO against the company.

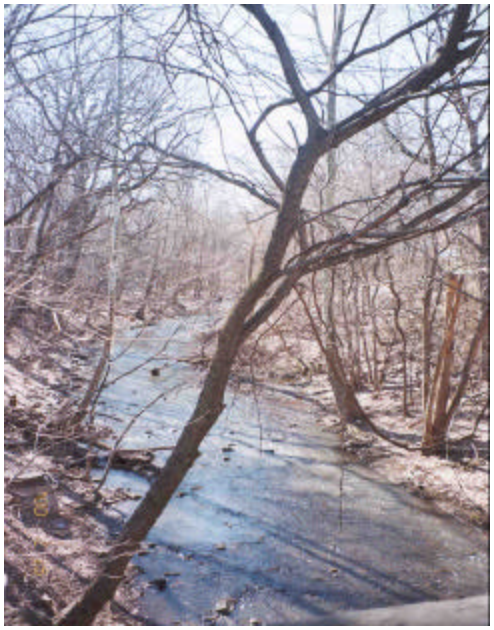
In an effort to identify any additional community concerns related to the site, the NJDHSS contacted the Middlesex County Public Health Department, the NJDEP, and the NJDHSS Right to Know Program. Attempts were also made to contact the NJPIRG in an effort to determine their current activities associated with the Mile Run Brook. According to the Middlesex County Public Health Department, community concerns regarding Rhodia Inc. for the last few years have been limited to publically stated complaints about transient odors.

Site Visit

On February 15, 2000, a site visit of the Rhodia Inc. site was conducted by representatives of the ATSDR, the EWA, and the NJDHSS. The inspection focused on the Mile Run Brook which runs through the company's property and continues (intermittently both above and below ground level) through residential areas of New Brunswick and Franklin Township, Somerset County. The

premises of Rhodia Inc. were not inspected on this day. The following observations were made during the site visit:

- Industry, residences (single family homes, row homes, apartments), a playground (Simplex Park), and cemetery are located within the immediate vicinity of the Rhodia Inc. site.
- An acrid odor, apparently emanating from the surface water, was noticeable while standing at street level above the Mile Run Brook near Rhodia Inc.'s Jersey Avenue entrance.
- The brook runs underground, then re-emerges west of the Rhodia Inc. site at Hamilton Street (Route 514) in Franklin Township, Somerset County. Here, the Douglass Gardens Apartments are adjacent to the brook. No odor was noticeable at this location.



Mile Run Brook

Subsequent to the site visit, the EWA petitioned the ATSDR for the initiation of a Public Health Consultation; the petition was accepted by the ATSDR in late June 2000. The EWA also conducted additional sampling of the Mile Run Brook on February 21, 2000.

On July 25, 2000 the NJDHSS held a meeting with representatives of the EWA, ATSDR, Raritan Valley Greens, the New Brunswick Environmental Commission, the New Jersey Work Environment Council, and the Franklin Township Health Department to explain and discuss the Public Health Consultation being prepared for the Rhodia Inc. site, as well as to schedule and set an agenda for two public Availability Sessions. The purpose of an Availability Session is to provide community members with the opportunity to discuss, one-on-one with staff of the NJDHSS and ATSDR, health concerns and other complaints they feel are related to a site. Two Availability Sessions were held on August 29, 2000 for the Rhodia Inc. site. A total of approximately 40 community members attended the sessions. In addition to odor complaints and concerns as to the potential impact of contaminated surface water (Mile Run Brook) on groundwater and area potable wells, health concerns expressed included: newly diagnosed asthma, skin rashes, dry throat, aggravated seasonal allergies, and death of long time area residents due to cancer (lung, prostate). Community members also voiced their concern and frustration with solid waste dumping, litter, and rat infestation of the Mile Run Brook.

In addition to the two Availability Sessions, representatives of the ATSDR, NJDHSS, and New Brunswick Environmental Commission participated in a tour of the Rhodia Inc. site earlier that same day. The tour, which was conducted by Rhodia Inc. plant management staff, included a briefing on the Rhodia Inc. site, walking the grounds of the site, inspecting the section of the Mile Run Brook located on the site, and touring Building 11 where the production of coumarin and salicylaldehyde take place. The tour concluded with a question and answer session.

Prior ATSDR Activity

No prior ATSDR or NJDHSS activity has been conducted at this site.

Environmental Contamination

Because of the ongoing nature of environmental investigation, monitoring, and remediation at the Rhodia Inc. site, extensive data regarding the Rhodia Inc. site are available. For the purpose of this Public Health Consultation, recent on-site and off-site data were reviewed and analyzed. These data include the results of environmental sampling performed by Rhodia Inc. environmental consultants (URS Corporation: May 12, 2000; Harding Lawson Associates: April 28, 2000) and the EWA (October 16, 1999 and February 21, 2000). On-site soil samples were collected by the URS Corporation and on-site surface water samples were collected by Harding Lawson Associates. EWA samples (soil and surface water) were collected off-site, adjacent to, and downstream of the Rhodia Inc. property in areas which are considered to be accessible to the public. Off-site environmental data provided by the EWA to the NJDHSS and the ATSDR for review in this consultation were limited and may not fully characterize or delineate potential contaminants of the Mile Run Brook in all areas.

Contaminants determined to be present in the soils constituting the banks of the Mile Run Brook were compared to health screening values. Health screening values utilized included ATSDR Health Comparison Values (HCVs) and USEPA Region III Risk-based Concentrations (RBCs). Contaminants which were present at levels which exceeded health screening values were considered for further evaluation. Those contaminants present at levels less than health screening values were evaluated as not likely to constitute a public health concern.

To determine the potential public health significance of contaminants detected in Mile Run Brook surface water samples collected by EWA, findings were compared to New Jersey drinking water MCLs. Although the potential route of exposure to surface water contaminants was assumed to be incidental ingestion, MCLs were utilized (which assume chronic ingestion: two liters per day for adults; one liter per day for children) as this was viewed as most protective of the public health.

On-Site Contamination

On-site refers to areas of the Mile Run Brook within the Rhodia Inc. site property boundary. The Rhodia Inc. site is inaccessible to the general public (a perimeter fence and staffed guard house control site access); these data are provided for comparison with available off-site data collected by the EWA.

Soil

Maximum concentrations of contaminants detected in surface soil samples (0 - 6 inches depth) collected by URS Corporation are provided in Appendix A. Various volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, and metals were detected in the soil. Substances detected above health screening values included: benzidine; several PAHs, i.e., benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene; pesticides (4-4'-DDE and dieldrin); PCBs; and arsenic. Lead and zinc were detected at levels above NJDEP (non-residential) Soil Clean-up Criteria.

Banks of Mile Run Brook.

The maximum concentration of the “four C’s” detected in soil were 25 parts per million (ppm) of camphene, 1,300 ppm of camphor, 110 ppm of cumene, and 3.6 ppm of coumarin. No criteria or health standards currently exist for camphene, camphor, or coumarin.

In December 2000, soil remediation activities at the Rhodia Inc. site uncovered several additional areas of contamination, one of which contained 49,000 ppm of PCBs (URS 2001). This “hotspot” was located in an area inaccessible to both the general public and employees. This contamination was found not to have adversely impacted the Mile Run Brook stream water or sediment quality (NJDEP 2001). A geotextile fabric currently covers this hotspot as an immediate interim measure until a final remedy can be developed

Surface Water

Table 2 provides the maximum concentration of substances detected in Mile Run Brook surface water samples collected by Harding Lawson Associates (April 28, 2000). Lead and trichloroethene were detected at concentrations above NJDEP Surface Water Quality Standards (N.J.A.C. 7:B, April 1998). The maximum concentration of three of the "four C's" detected in surface water samples included 110 parts per billion (ppb) camphor, 0.3 ppb cumene, and 44,000 ppb coumarin (tentatively identified).

Off-Site Contamination

For the purposes of this consultation, off-site refers to areas of the Mile Run Brook which are downstream and primarily adjacent to the Rhodia Inc. property. The EWA collected samples along the banks of the Mile Run Brook downstream of the Rhodia Inc. site (eight soil samples) and two of the surface water. Several contaminants were detected, however, they may not in all cases originate from the Rhodia Inc. site as indicated by upstream sampling results (Killam Associates 2000) (see Appendix A).

Soil

Maximum concentrations of contaminants detected in surface soil samples (0 - 8 inches depth) collected by EWA are provided in Appendix A. Those compounds detected in surface soils of the banks of the Mile Run Brook above health screening values are presented in Table 3 and include: several PAHs, i.e., benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene; PCBs; and several metals (arsenic, cadmium, and lead). The maximum concentration of camphor in soil samples collected by EWA was 47 ppm; soil samples collected by EWA were not analyzed for camphene, cumene, or coumarin.

Surface Water

Maximum concentrations of contaminants detected in surface water samples collected by EWA downstream of the Rhodia Inc. site are provided in Table 2. Substances detected above New Jersey drinking water Maximum Contaminant Levels (MCLs) included trichloroethene and methylene chloride; mercury approached the MCL. The maximum concentration of camphor in surface water samples collected by EWA was 94.1 ppb. Surface water samples collected by EWA were not analyzed for camphene, cumene, or coumarin.

Discussion

This discussion will examine the potential for human exposure to environmental media (soils and surface water) of the Mile Run Brook downstream from the Rhodia Inc. site, and consider the public health implications of potential exposure to contaminants in these media.

Pathways Analysis

An exposure pathway is the process by which an individual is exposed to contaminants from a source of contamination and consists of the following five elements:

(1) source of contamination;
(2) environmental media (e.g., air, groundwater, surface water, soil, sediment, biota);
(3) point of exposure (i.e., location of potential or actual human contact with a contaminated medium);
(4) route of exposure (e.g., inhalation, dermal contact/absorption, ingestion); and
(5) receptor population.

A completed exposure pathway exists when the five elements of a pathway link the contaminant source to a receptor population. Pathways for which the Mile Run Brook constitutes a potential source of exposure to contamination are depicted as follows:

Potential Human Exposure Pathways				
Pathway Name	Environmental Medium	Point of Exposure	Route of Exposure	Exposed Population
soil and sediment	soil and sediment	Mile Run Brook and its banks	dermal contact, incidental ingestion	nearby residents (includes children), community volunteers who may clean trash and debris from the brook
surface water	surface water	Mile Run Brook	dermal contact, incidental ingestion	nearby residents (includes children), community volunteers who may clean trash and debris from the brook

The NJDHSS and the ATSDR evaluated potential human exposure pathways associated with contaminants detected by the EWA in the Mile Run Brook. Based upon the data and information provided, pathways evaluated in this consultation are associated with the soils from the banks of the Mile Run Brook and the surface water from the Mile Run Brook. Specifically, these pathways include the ingestion of and/or dermal contact with soils and surface water. These pathways are pertinent to adults and children who may come in contact with these media such as community volunteers who clean trash and debris from the Mile Run Brook, and children who play along the banks of the brook. Data provided describing soil contaminants are limited in terms of the scope of contaminants tested for and the number of locations along the brook which were sampled. While the maximum concentrations of contaminants detected by the EWA are discussed, the data may not be representative of conditions at the Mile Run Brook.

Sections of the Mile Run Brook where soils and surface water samples were taken have been documented to emit noticeable odors. However, there were no air monitoring data available for review during preparation of this Public Health Consultation. Therefore, the potential public health implications of the inhalation of volatile substances associated with the Mile Run Brook could not be evaluated.

Assessment Methodology

In order to determine the potential public health significance of the data provided to the NJDHSS by the EWA, the following methodology was applied.

To examine the potential for a health risk associated with those compounds determined to be present above health screening values, the NJDHSS and the ATSDR attempted to determine what degree of contaminant exposure would be necessary to constitute a public health concern. To accomplish this, the route of exposure to soil contaminants (on the banks of the Mile Run Brook) was assumed to be chronic ingestion, as this was viewed as the most protective of public health. (Actual exposures may be variable and of acute, or short-term, duration.) This exposure pathway assumes an adult or child would be in contact with soils of the Mile Run Brook on a daily basis. For each contaminant, either the ATSDR Minimal Risk Level (MRL) or the USEPA Reference Dose (RfD) was utilized as a level where exposure may represent a potential for public health concern.

Based upon the contaminant concentration detected by the EWA, the amount of soil ingestion necessary to achieve each respective MRL/RfD was calculated. This amount of soil was then compared to the standard ingestion rates for chronic exposure, i.e., 100 milligram (mg) per day for adults, 200 mg per day for children. Those compounds where it was necessary to ingest more than that amount to achieve the MRL/RfD were evaluated as not likely to constitute a potential public health concern. Those compounds where the MRL/RfD could be achieved with less than the standard chronic ingestion rates are examined in the context of a potential exposure pathway below.

In addition, for those compounds considered to be carcinogens, lifetime excess cancer risk was estimated, based upon calculated exposure doses derived from the maximum contaminant level detected.

Public Health Implications

Soils

As stated in the Assessment Methodology section above, MRLs were utilized to assess the potential for toxicological significance of the exposure pathways identified for contaminated soils of the Mile Run Brook. The MRL is an estimate of the exposure level at which adverse (excluding cancer) health effects are not expected to occur in non-hypersensitive individuals. MRLs and RfDs are based largely on toxicological studies in animals and on reports of human occupational (workplace) exposures. Exposure to a level above the MRL/RfD does not mean that adverse health effects will occur. The ATSDR derives MRLs using quantitative and qualitative information for many potential systemic, neurological, and developmental effects. MRLs and RfDs are specific for the route and the duration of exposure.

At the present time, MRLs for the dermal route of exposure have not been derived. Factors which affect absorption through skin include the surface area of skin in contact with a contaminant, duration of contact, and rate of transport. It is difficult to quantify absorbed dermal doses, and health guidelines are not readily available.

As shown in Table 4, there were several contaminants for which a child or adult would have to ingest less than the standard chronic ingestion rate to attain the MRL. These contaminants included cadmium, lead, and PCBs. (For arsenic, the amount of contaminated soil an adult and/or child would have to ingest on a daily basis to attain the MRL would be improbably high.) MRLs are not available for the PAHs of concern which included benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene. For these compounds, toxicity was considered on an aggregate basis (using toxicity equivalent factor evaluation method) and an exposure dose calculated for estimations of carcinogenic and non-carcinogenic risk. In addition, there is no MRL for camphor.

Cadmium. Cadmium occurs naturally in the environment. Much of the cadmium ingested by humans comes from food and ultimately, from the soil. Cigarette smoke is also a source of cadmium exposure (TOMES 2000). Human health effects due to chronic, low-level exposure to cadmium are not definitive at present, but kidney damage and bone fragility are possible outcomes (ATSDR 1999A). Cadmium is classified as a probable human carcinogen by the USEPA.

At the Mile Run Brook, based upon the maximum concentration of cadmium detected by the

EWA (115 ppm), a child would have to ingest approximately 36.5 mg of contaminated soil every day for a dose equal to the MRL to be achieved. Under realistic exposure scenarios, it is highly unlikely that a child or adult would frequent the site and ingest a sufficient quantity of cadmium contaminated soil to constitute a dose where adverse health effects would be expected in non-hypersensitive individuals. Thus, for plausible levels and durations of exposure, the concentration of cadmium in soils of the Mile Run Brook does not present a public health hazard.

Lead. There are many sources of lead in the environment. Persons may be exposed to lead in a variety of ways including in the workplace (e.g., demolition workers, welders, painters, plumbers, radiator repair workers, scrap yard workers), at home through the renovation of older houses with lead-based paint, and hobbies (e.g., reloading ammunition, creating stained-glass, making fishing sinkers). A great deal of information is available on lead toxicity, including studies on occupational and environmental exposures. Occupational exposures occur primarily through inhalation; conversely, exposures to the general population usually occur through the oral route (mainly children) with some contribution through inhalation. The effects of lead are the same regardless of the route of entry into the body. Some animal studies have linked exposure to lead with cancer, however, there is inconclusive evidence relating oral lead exposure with cancer (ATSDR 1999B).

Currently, there is no MRL or RfD for lead. At the Mile Run Brook, based upon the maximum concentration of lead detected by the EWA (884 ppm), a child would have to ingest approximately 23.8 mg of contaminated soil every day to achieve a dose equal to the lowest dose shown to cause neurological or reproductive effects in rats (ATSDR 1999B). In addition, the USEPA has recently established new standards for lead in soils of residential yards. Lead levels in bare soil exceeding 400 mg/kg in play areas or averaging over 1,200 mg/kg in bare soil for the rest of the yard are considered hazardous (USEPA 2001). The average lead level determined in the sample data provided by the EWA is approximately 329 mg/kg. Under realistic exposure scenarios, to either the maximum or average lead concentrations detected, it is highly unlikely that a child or adult would frequent the site and thereby ingest a sufficient quantity of lead contaminated soil to constitute a dose where adverse health effects would be expected in non-hypersensitive individuals. Thus, for plausible levels and durations of exposure, the concentration of lead in soils of the Mile Run Brook does not present a public health hazard.

PCBs. PCBs are a group of synthetic organic chemicals that contain 209 individual chlorinated biphenyl compounds known as congeners (ATSDR 1997A). PCBs are man-made; there are no known natural sources of PCBs in the environment. PCBs may occur as either an oily liquid or as a solid, and are colorless to light yellow in color. Because they do not burn easily and are good insulating materials, PCBs have been used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. A common way that PCBs may enter the environment is through accidents during their transport, or from leaks, fires, or vandalism of transformers, capacitors, and other products containing PCBs. The manufacture of PCBs in the United States stopped in the late 1970s because of evidence that PCBs accumulate in the environment and cause harmful effects.

The mixtures of PCBs which were sold commercially exhibited varying degrees of chlorination. The more highly chlorinated congeners are less able to be metabolized and thus are more persistent in the environment. Since they are fat soluble, PCBs tend to accumulate in the adipose or fatty tissue of humans and other animals, such as fish and beef. Certain PCBs have been shown to alter hormonal systems in humans and animals, and are toxic to lymphoreticular systems at low levels. The USEPA considers PCBs to be a probable human carcinogen.

At the Mile Run Brook, based upon the maximum concentration of PCBs detected by the EWA (11 ppm), a child would have to ingest approximately 38.2 mg of contaminated soil every day, for a dose equaling the RfD to be achieved. Under realistic exposure scenarios, it is highly unlikely that a child or adult would frequent the site and ingest a sufficient quantity of PCB contaminated soil to constitute a dose where adverse carcinogenic or non-carcinogenic health effects would be expected in non-hypersensitive individuals. Similarly, levels of PCBs documented in soils of the Mile Run Brook are much lower than levels associated with a dermal exposure risk as cited in the ATSDR Toxicological profile for PCBs (ATSDR 1997A). Thus, for plausible levels and durations of exposure, the concentration of PCBs in soils of the Mile Run Brook does not present a public health hazard.

Additionally, based upon the estimated exposure dose for the maximum concentration of PCBs detected, a lifetime theoretical excess cancer risk (LECR) was calculated. For estimations of LECR for adults, a body weight of 70 kilograms (kg) and an exposure duration of two days per week for 10 years was assumed. Given these assumptions, a LECR in the range of 1.25×10^{-6} was estimated. It is therefore highly unlikely that a person would develop cancer as a result of incidental ingestion of PCB contaminated soil at the Mile Run Brook.

PAHs. PAHs are a group of chemicals that may be formed as products of the incomplete combustion of fuels, wood, and other materials, or other organic substances, such as tobacco (TOMES 2000). PAHs are found throughout the environment in the air, water, and soil, and can either be synthetic or naturally occurring. Many PAHs have no practical use except for research purposes, although some are used in medicines and in the making of dyes, plastics, and pesticides. Other PAHs are contained in the asphalt aggregate used in road construction. Typically, human exposures occur to mixtures of PAHs rather than to an individual PAH. Non-cancer, chronic effects from PAH exposure at levels much higher than those seen at the Mile Run Brook may include respiratory, dermal, and eye irritation, and photosensitivity. Animal studies involving exposures to individual PAHs have shown the potential for adverse health effects including reproductive problems, birth defects, immune system defects, and cancer (ATSDR 1995).

In soils of the banks of the Mile Run Brook, as reported by EWA, there were seven PAH compounds detected (this number does not include estimated values). Although only four occurred in excess of health screening values (see Table 5 and Appendix A), the toxicity of each PAH was

compared to that of benzo(a)pyrene, enabling the calculation of a Toxic Equivalency Factor (TEF), which provides an estimate of the combined estimated exposure dose for the class of compounds (ATSDR 1995). When applied to a likely childhood exposure scenario (body weight of 21 kg and 200 mg/day ingestion), this estimated exposure dose is at least four orders of magnitude below the lowest observed adverse effect level (LOAEL: hepatic effects in mice) for benzo(a)pyrene. At such concentrations, non-carcinogenic health effects would not be expected. Similarly, levels of PAHs documented in soils of the Mile Run Brook are much lower than levels associated with dermal exposure risk as cited in the ATSDR Toxicological Profile for PAHs (ATSDR 1995). Thus, for plausible levels and durations of exposure, the concentrations of PAHs in soils of the Mile Run Brook do not present a public health hazard in terms of non-cancer adverse health effects.

In addition, based upon the estimated TEF exposure dose, a LECR was calculated. For estimations of LECR for adults, a body weight of 70 kg and an exposure duration of two days per week for 10 years was assumed. Given these assumptions, a LECR in the range of 7×10^{-5} was estimated. It is therefore highly unlikely that a person would develop cancer as a result of incidental ingestion of PAHs in the contaminated soil at the Mile Run Brook.

Camphor. Camphor was reported by the EWA to be present in soils of the Mile Run Brook at a maximum concentration of 47 ppm. Camphor exhibits no public health or toxicological concern at the levels cited. In fact, camphor is a common component of many cosmetics and pharmaceuticals. The concentrations of camphor in these products (intended for direct application), ranging from 0.5% to 10.8 % by volume, are many times greater than what has been documented to be present in soils of the Mile Run Brook (approximately 0.005 %) (Arena 1986). As such, for plausible levels and durations of exposure, the concentration of camphor in soils of the Mile Run Brook does not present a public health hazard.

Surface Water

Table 2 presents those compounds documented by the EWA to be present in surface water samples of the Mile Run Brook. As shown, trichloroethene, mercury, and methylene chloride were detected at or near their respective MCLs for drinking water. MCLs assume the ingestion of two liters of water per day every day over a lifetime (70 year) period. The pathway associated with surface water of the Mile Run Brook is for incidental ingestion of a comparatively small quantity of water on an infrequent basis. Thus, for plausible levels and durations of exposure, the concentrations of the above compounds in the surface waters of the Mile Run Brook do not present a public health hazard. Similarly, the compounds noted are not present at concentrations where dermal contact would constitute a public health hazard (ATSDR; 1999B, 1997, 1999C, 1998). Additionally, since methylene chloride is a common laboratory contaminant, the concentrations detected in off-site surface water may be an artifact of sampling or analysis.

Camphor was reported by the EWA to be present in surface water of the Mile Run Brook at

a maximum concentration of 94.1 ppb. Camphor exhibits no public health or toxicological concern at the levels cited. In fact, camphor is a common component of many cosmetics and pharmaceuticals. As stated previously, the concentrations of camphor in these products are many times greater than what has been documented to be present in the surface water of the Mile Run Brook. As such, for plausible levels and durations of exposure, the concentration of camphor in surface waters of the Mile Run Brook does not present a public health hazard.

Child Health Considerations

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination in their environment. Children are at greater risk than adults from certain kinds of exposures to hazardous substances because they eat and breathe more than adults. They also play outdoors and often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors closer to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most important, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care.

The NJDHSS, in conjunction with the ATSDR, evaluated the likelihood for children to be exposed to contaminants detected in the vicinity of the Rhodia Inc. site and particularly along the Mile Run Brook. Figure 2 shows the Rhodia Inc. site in relationship to the Mile Run Brook and surrounding community. According to the EWA, there exist numerous areas along the Mile Run Brook where potential access by children is not restricted. The Mile Run Brook contains physical hazards for children, and has not been fully characterized in terms of the location and nature of potential contaminants.

Conclusions

Based on a review of the data and information provided by the EWA regarding the Mile Run Brook, the NJDHSS and ATSDR conclude that contaminants determined to be present in off-site soils and surface water currently pose *No Apparent Public Health Hazard*. Although lead, cadmium, PCBs and PAHs are present at levels of potential concern, it is unlikely that adults or children would be exposed to the degree necessary to constitute a dose of public health significance under present conditions. However, this determination is based upon limited off-site data provided by the EWA which accompanied the petition to the ATSDR. Recent environmental monitoring of the Mile Run Brook may not be sufficient in terms of fully delineating the nature and extent of potential contaminants. Changes in conditions of the Mile Run Brook, or the availability of additional data and information, may necessitate that the public health hazard category be reconsidered by the NJDHSS and the ATSDR, as warranted.

Based upon the current state of remedial activities and investigation, continuing characterization of the Rhodia Inc. site is desirable to provide additional information regarding the potential for human exposure pathways associated with on-site and off-site contamination.

The conclusions presented in this Public Health Consultation are based on recent sampling data and information. Conditions of the Mile Run Brook, and consequent public health issues, may have differed significantly in the past.

Recommendations

Cease/Reduce Exposure Recommendations

Persons entering the area of the Mile Run Brook should minimize contact with contaminated soils and surface water. As a precaution, appropriate personal protective clothing should be worn during voluntary clean-up activities to preclude exposure as a result of incidental ingestion or other mechanisms. Odors of unknown composition emanating from the Mile Run Brook may necessitate additional precautions for potential air contaminants.

Several areas of the Mile Run Brook are accessible to the public, and may constitute an attraction for children. Children should avoid unnecessary and/or prolonged contact with soils and surface water of the Mile Run Brook. In addition, as stated above, the Mile Run Brook contains numerous physical hazards which should be avoided by children.

Site Characterization Recommendations

The data supplied to the NJDHSS and the ATSDR by the EWA regarding the quality of the Mile Run Brook were limited. Additional sampling of the Mile Run Brook downstream of the Rhodia site (in areas accessible to the public) is indicated to more fully delineate possible off-site contamination which may constitute a public health risk. Such sampling should employ methods appropriate to determine contaminants known to be present on the Rhodia site. In addition, sampling to determine the nature and extent of potential air contaminants (volatilizing from surface water) should be conducted.

Ongoing environmental investigation and activity at the Rhodia Inc. site should be reviewed for potential public health implications. Additional data and/or information generated as a result should be reviewed in the context of potential human exposure pathways.

Public Health Action Plan

The Public Health Action Plan (PHAP) for the Rhodia Inc. site contains a description of the

actions to be taken at or in the vicinity of the site. The purpose of the PHAP is to ensure that this Public Health Consultation not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of the NJDHSS and the ATSDR to follow-up on this plan to ensure its implementation. The public health actions taken or to be implemented are as follows:

Public Health Actions Undertaken by NJDHSS/ATSDR:

Data and information provided by the Edison Wetlands Association as the basis for this petitioned consultation have been evaluated by the NJDHSS/ATSDR to determine the public health implications of potential human exposure pathways.

Three availability sessions (the third of which took place on September 6, 2001 and provided to the community an overview of results and conclusions described in this report) have been conducted as part of community outreach activities performed in support of this Health Consultation.

The NJDHSS has prepared a Citizen's Guide as a companion document to this Health Consultation.

Public Health Actions Planned by NJDHSS/ATSDR:

The NJDHSS and ATSDR will review additional environmental monitoring results obtained for either on-site or off-site areas, as well as changes in conditions at the Rhodia Inc. site within the context of potential human exposure pathways.

The NJDHSS and the ATSDR will conduct additional availability sessions and/or provide educational material to the community regarding public health concerns associated with the Rhodia Inc. site, as warranted.

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Preparers of Report:

James Pasqualo, M.S.
ATSDR Health Assessment Project Manager

Julie R. Petix, M.P.H., C.P.M., H.O.
Health Assessor

Steven Miller, M.S., Ph.D.
Environmental Scientist

ATSDR Regional Representative:

Arthur Block
Senior Regional Representative, Region II
Regional Operations
Office of the Assistant Administrator

ATSDR Technical Officer:

Gregory V. Ulirsch
Technical Project Officer
Superfund Site Assessment Branch (SSAB)
Division of Health Assessment and Consultation (DHAC)

Any questions concerning this document should be directed to:

James Pasqualo, M.S.
ATSDR Health Assessment Project Manager
New Jersey Department of Health and Senior Services
Division of Epidemiology, Environmental and Occupational Health
Consumer and Environmental Health Services
P.O. Box 369
Trenton, New Jersey 08625-0369

Table 1 - Rhodia Inc., New Brunswick, Middlesex County, NJ: The "Four C's"

Substance	Occurs in...	Use	Exposure Routes	Target Organs
camphor ($C_{10}H_{16}O$) (CAS # 76-22-2)	...all parts of the camphor tree; more than three-fourths of the camphor sold in the USA is produced synthetically usually from pinene.	excellent plasticizer for cellulose esters and ethers; used in the manufacture of plastics, especially celluloid; in lacquers and varnishes; in pyrotechnics; as moth repellent; in embalming fluids; as preservative in pharmaceuticals and cosmetics	inhalation, skin and/or eye contact, ingestion	eyes, skin, respiratory system, CNS
camphene ($C_{10}H_{16}$) (CAS # 79-92-5)	...many essential oils, such as turpentine, cypress oil, camphor oil, bergamot oil, oil of citronella, neroli, ginger, valerian.	food additive; flavoring agent; chemical intermediate for the perfume component, isobornyl acetate; manufacture of synthetic camphor; camphor substitute; used in tablet form for mothproofing	inhalation, skin absorption, ingestion	eyes, skin
coumarin ($C_9H_6O_2$) (CAS # 91-64-5) (odor resembles that of vanilla beans)	...tonka beans, lavender oil, woodruff, and in sweet clover.	important raw material in the fragrance industry; widely used in hand soaps, detergents, lotions, and perfumes; odor enhancer to achieve a long lasting effect when combined with natural essential oils such as lavender, citrus, rosemary, oak moss, etc.; used in tobacco to enhance its natural aroma; formerly, large quantities were used in the food industry mostly associated with vanillin for flavoring chocolates, baked goods, and in the confection of cream soda flavored beverages, but since 1954 its use in food has been suspended in the U.S.	inhalation, skin absorption	liver
cumene (C_9H_{12}) (CAS # 98-82-8) (isopropyl benzene)	...a variety of natural substances including essential oils from plants, marsh grasses, and a variety of foodstuffs.	thinner for paints and enamels; constituent of some petroleum-based solvents; in the manufacture of phenol, acetone, acetophenone, alpha-methylstyrene; minor amounts are used in gasoline blending	inhalation, ingestion, skin and/or eye contact	eyes, upper respiratory system, skin, CNS

source:
The Merck Index, 11th edition, 1989
Toxicology, Occupational Medicine and Environmental Series (TOMES) Consolidated Point Solution, 2000

Table 2 - Comparison of Positively Identified Contaminants Detected in Surface Water of the Mile Run Brook. Maximum reported concentrations in µg/l.

Compound	On -Site HL Assoc.	Off- Site EWA	N.J. Maximum Contaminant Level (Drinking Water)	NJDEP Surface Water Quality Standards
Lead	6.5 (total); 3 (dissolved)	ND	0 (MCLG)	5*
Trichloroethene	2.4	1.55	1	1.09**
Camphor	110	94.1	NA	NA
Cumene	0.3	NAF	NA	NA
Coumarin	44,000 (total); 27,000 (dissolved; tentatively identified)	NAF	NA	NA
Mercury	ND	1.9	2	0.144*
Methylene chloride	ND	17.8	3	2.49**

MCLG = Maximum Contaminant Level Goal
ND = none detected
NAF = Not analyzed for
NA = Not available
*non-carcinogenic effect-based human health criteria
**carcinogenic effect-based human health criteria
HL Associates: n=18 samples, represents six transect locations comprised of three samples (eastern, middle, and western side of the Mile Run Brook)
EWA: n=2 samples

Table 3 - Comparison of Positively Identified Contaminants Detected in Surface Soil Samples of the Mile Run Brook. Maximum reported concentrations detected, all values in mg/kg.

Compound	On-Site URS Corp. (0-6 Inches)	Off-Site EWA (0-8 Inches)	Health Screening Values	NJDEP Soil Criteria Residential	NJDEP Soil Criteria Non-Residential
Benz(a)anthracene	2.9	14	0.87 (RBC) (C)	0.9	4
Benzo(a)pyrene	3.2 J	20	0.1 (CREG)	0.66	0.66
Benzo(b)fluoranthene	4.7	27	0.87 (RBC) (C)	0.9	4
Indeno(1,2,3-c,d)pyrene	2.8 J	9 J	0.87 (RBC) (C)	0.9	4
PCBs	200*	11	0.4 (CREG)	0.49	2
Arsenic	30.4	20.1	0.5 (CREG)	20	20
Cadmium	5.3	115	10 (child, chronic EMEG)	39	100
Lead	1,420	884	not available	400	600

J = estimated value
RBC = USEPA Risk-based Concentration for residential soils; (C) = carcinogenic effects, (N) = non-carcinogenic effects
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (1 in a million) excess cancer risk
EMEG = ATSDR Environmental Media Evaluation Guide
*Aroclor-1260

Table 4 - Chronic Soil Ingestion Rates Necessary to Achieve the Minimal Risk Level or Reference Dose.

Compound	Maximum Concentration mg/kg	Minimal Risk Level or Reference Dose mg/kg/day	Adult Soil Ingestion Rate mg/day	Child Soil Ingestion Rate mg/day
Arsenic	20.1	0.0003	1044.8	313.4
Benz(a)anthracene	14	not available		
Benzo(a)pyrene	20	not available		
Benzo(b)fluoranthene	27	not available		
Cadmium	115	0.0002	121.7	36.5
Indeno(1,2,3-c,d)pyrene	9	not available		
Lead	884	not available (0.001*)	79.2	23.8
PCBs	11	0.00002	127.3	38.2

MRL = Minimal Risk Level for effects other than cancer
mg/kg/day = milligrams per kilograms per day
mg/day = milligrams per day
* = Lowest “No Observed Adverse Effect Level” cited in the ATSDR Toxicological Profile for Lead; reproductive and developmental effects in rats.

Appendix A - Mile Run Brook, New Brunswick, Middlesex County. Comparison of Positively Identified Compounds Detected in Surface Soils of the Bank, 0-6 inches. All values in mg/kg, and represent maximum detected concentrations.

Contaminant	On-Site URS [1]	Off-Site EWA [2]	Upstream [3]	Health Screening Values	NJDEP Soil Criteria (Residential)	NJDEP Soil Criteria (Non-Residential)	NJDEP Guidance for Sediments [4]
Volatile Organics							
Benzene		0.00162		10 (CREG)	3	13	
Camphene	25 J			NA			
Camphor	1,300	47		NA			
Carbon tetrachloride	0.089 J			5 CREG	2	4	
Chlorobenzene	0.16 J	0.00159		1,000 RMEG (Child)	37	680	
Ethylbenzene	0.17 J			5,000 RMEG (Child)	1,000	1,000	
Chloroform		0.00311		100 CREG	19	28	
Cumene	110			7,800 RBC (N)			
Ethylbenzene		0.00104		5,000 RMEG (Child)	1,000	1,000	
Methyl-t-butyl ether		0.00126		20,000 EMEG (Child)			
Methylene Chloride		0.0935		90 CREG	49	210	
Toluene	4.7 J	29		1,000 EMEG (Child)	1,000	1,000	
Trichloroethene		0.00607		58 RBC (C)	23	54	
Xylene (total)	0.19 J	0.00147		10,000 EMEG (Child)	410	1,000	

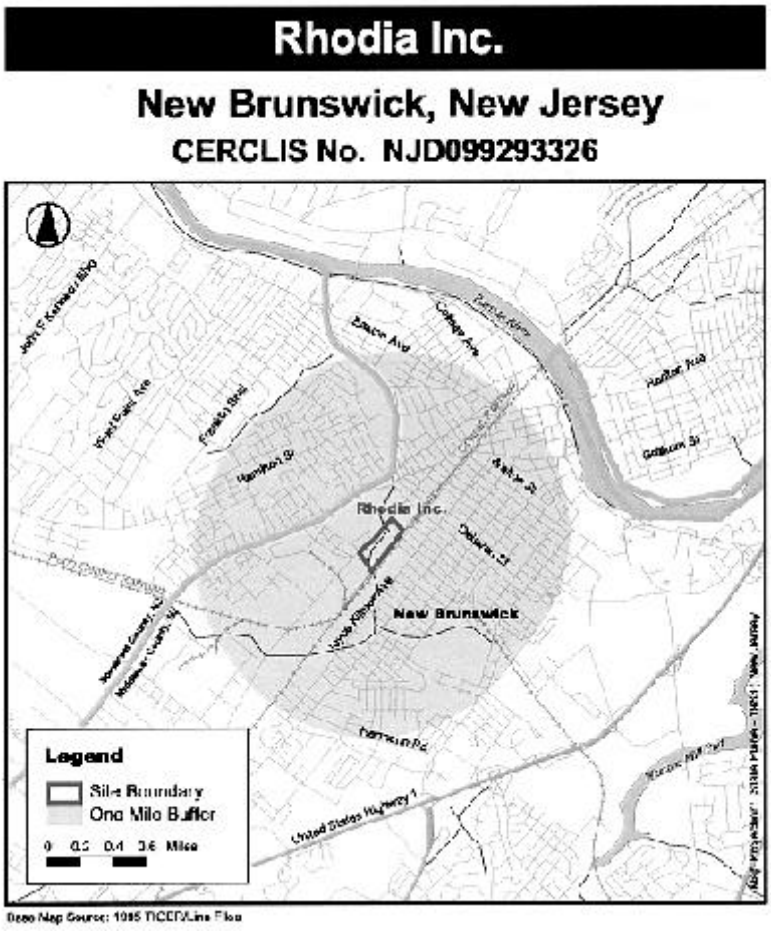
Contaminant	On-Site URS [1]	Off-Site EWA [2]	Upstream [3]	Health Screening Values	NJDEP Soil Criteria (Residential)	NJDEP Soil Criteria (Non-Residential)	NJDEP Guidance for Sediments [4]
Semi-Volatile Organics							
1,2,4-trichlorobenzene	0.75			500 RMEG (Child)	68	1,200	
1,2,4-trimethylbenzene		0.00135		3,900 RBC (N)			
1,2-dichlorobenzene	0.081 J			5,000 RMEG (Child)	5,100	10,000	
1,3-dichlorobenzene	2 J			2,300 RBC (N)	5,100	10,000	
1,4-dichlorobenzene	6 J		0.096	20,000 EMEG (Child)	570	10,000	
2,4-dimethylphenol	0.043 J			1000 RMEG (Child)	1,100	10,000	
2-chlorophenol	0.086 J			300 RMEG (Child)	280	5,200	
Acenaphthene	0.35 J		0.12	3,000 RMEG (Child)	3,400	10,000	0.016
Acenaphthylene	1.1 J		0.3	NA			0.044
Anthracene	0.85 J		0.69	20,000 RMEG (Child)	10,000	10,000	0.22
Benzidine	0.42 J			0.003 CREG			
Benz(a)anthracene	2.9	14	1.9	0.87 RBC (C)	0.9	4	0.32
Benzo(a)pyrene	3.2 J	20	1.6	0.1 CREG	0.66	0.66	0.37
Benzo(b)fluoranthene	4.7	27	2.4	0.87 RBC (C)	0.9	4	
Benzo(g,h,i)perylene	2.8 J	7.7	0.64	NA			0.17
Benzo(k)fluoranthene	2.3	7.6	1.2	8.7 RBC (C)	0.9	4	0.24

Contaminant	On-Site URS [1]	Off-Site EWA [2]	Upstream [3]	Health Screening Values	NJDEP Soil Criteria (Residential)	NJDEP Soil Criteria (Non-Residential)	NJDEP Guidance for Sediments [4]
Bis(2-ethylhexyl) phthalate	1.3	0.779	0.5	46 RBC (C)	49	210	
Butylbenzyl phthalate	0.34 J			10,000 RMEG (Child)	1,100	10,000	
Chrysene	3.4	0.634	2.3	87 RBC (C)	9	40	0.34
Coumarin	3.6 J			NA			
Dibenz(a,h)anthracene	0.87		0.2	0.087 RBC (C)	0.66	0.66	0.06
Di-n-butylphthalate	0.1 J	16	0.1	7,800 RBC (N)	5,700	10,000	
Di-n-octylphthalate	0.11 J		0.083	1,600 RBC (N)	1,100	10,000	
Fluoranthene	5.5	20	4	2,000 RMEG (Child)	2,300	10,000	0.75
Fluorene	0.6 J		0.17	2,000 RMEG (Child)	2,300	10,000	0.19
Indeno (1,2,3-c,d) pyrene	2.8 J	9	0.72	0.87 RBC (C)	0.9	4	0.2
4-isopropyltoluene		0.00593		NA			
Naphthalene	0.53 J		0.15	1,000 EMEG (Child)	230	4,200	0.16
N-nitrosodiphenylamine	0.19 J			100 CREG	140	600	
Pentachlorophenol	0.032 J			6 CREG	6	24	
Phenanthrene	4.7	0.963	2.1	NA			0.56
Phenol	26	60		30,000 RMEG (Child)	10,000	10,000	

Contaminant	On-Site URS [1]	Off-Site EWA [2]	Upstream [3]	Health Screening Values	NJDEP Soil Criteria (Residential)	NJDEP Soil Criteria (Non-Residential)	NJDEP Guidance for Sediments [4]
Pyrene	5.2	17	3.2	2,000 RMEG (Child)	1,700	10,000	0.49
Pesticides/PCBs							
Aroclor-1248	3.8	11		0.4 CREG	0.49	2	
Aroclor-1260	200			0.4 CREG	0.49	2	
4,4'-DDD	0.021			3 CREG	3	12	
4-4'-DDE	2.4			2 CREG	2	9	
Dieldrin	0.15			0.04 CREG	0.042	0.18	
Endosulfan II	2.1			100 EMEG (Child)	340	6,200	
Endrin	3			20 EMEG (Child)	17	310	
Heptachlor	0.033			0.2 CREG	0.15	0.65	
Metals							
Antimony	4			20 RMEG (Child)	14	340	
Arsenic	30.4	20.1	10.4	0.5 CREG	20	20	6
Beryllium	1.4		0.86	50 EMEG (Child)	2	2	
Cadmium	5.3	115	0.8	10 EMEG (Child)	39	100	0.6
Chromium (Total)	2,270		66.2	80,000 RMEG (Child;+3)	120,000	Not Regulated	26
Copper	494		205	3,100 RBC (N)	600	600	16

Contaminant	On-Site URS [1]	Off-Site EWA [2]	Upstream [3]	Health Screening Values	NJDEP Soil Criteria (Residential)	NJDEP Soil Criteria (Non-Residential)	NJDEP Guidance for Sediments [4]
Lead	1,420	884	219	NA	400	600	31
Mercury	2.8	1.26	0.41	NA	14	270	0.2
Nickel	72.6		76	1,000 RMEG (Child)	250	2,400	16
Selenium	1.8			300 EMEG (Child)	63	3,100	
Silver	1.9 J			300 RMEG (Child)	110	4,100	1
Zinc	1,900		588	20,000 EMEG (Child)	1,500	1,500	120

1 = Samples collected by the URS Corp. May 12, 2000.
2 = Samples collected by the EWA October 16, 1999, and February 21, 2000.
3 = Samples collected by Killiam Associates, upstream of the Rhodia Inc site, as part of activities for a proposed youth sports complex to be located at Joyce Kilmer Avenue.
4 = Lowest Effect Level for adverse impacts to benthic organisms.
J = Concentration cited is an estimated value.
CREG = ATSDR Cancer Risk Evaluation Guide
EMEG = ATSDR Environmental Media Evaluation Guide
RMEG = ATSDR Reference Dose Media Evaluation Guide
RBC = USEPA Risk-based Concentration; C = Carcinogenic endpoints, N = Non-cancer endpoints.
Blank Cell = No Data
NA = Not Applicable



Total Population	34,897	Total Housing Units	13,122
White	19,117		
Black	11,594	Children ≤ 6 years	3,031
Hispanic	6,952	Adults ≥ 65 years	4,261
Asian/Pacific Islander	944	Females 15 - 44 years	9,498
A. Indian, Eskimo, Aleut.	96		
Other	3,153		

Demographics Statistics Source: 1990 United States Census

Figure 1 - Demographic information for a one mile radius of the Rhodia Inc. site.

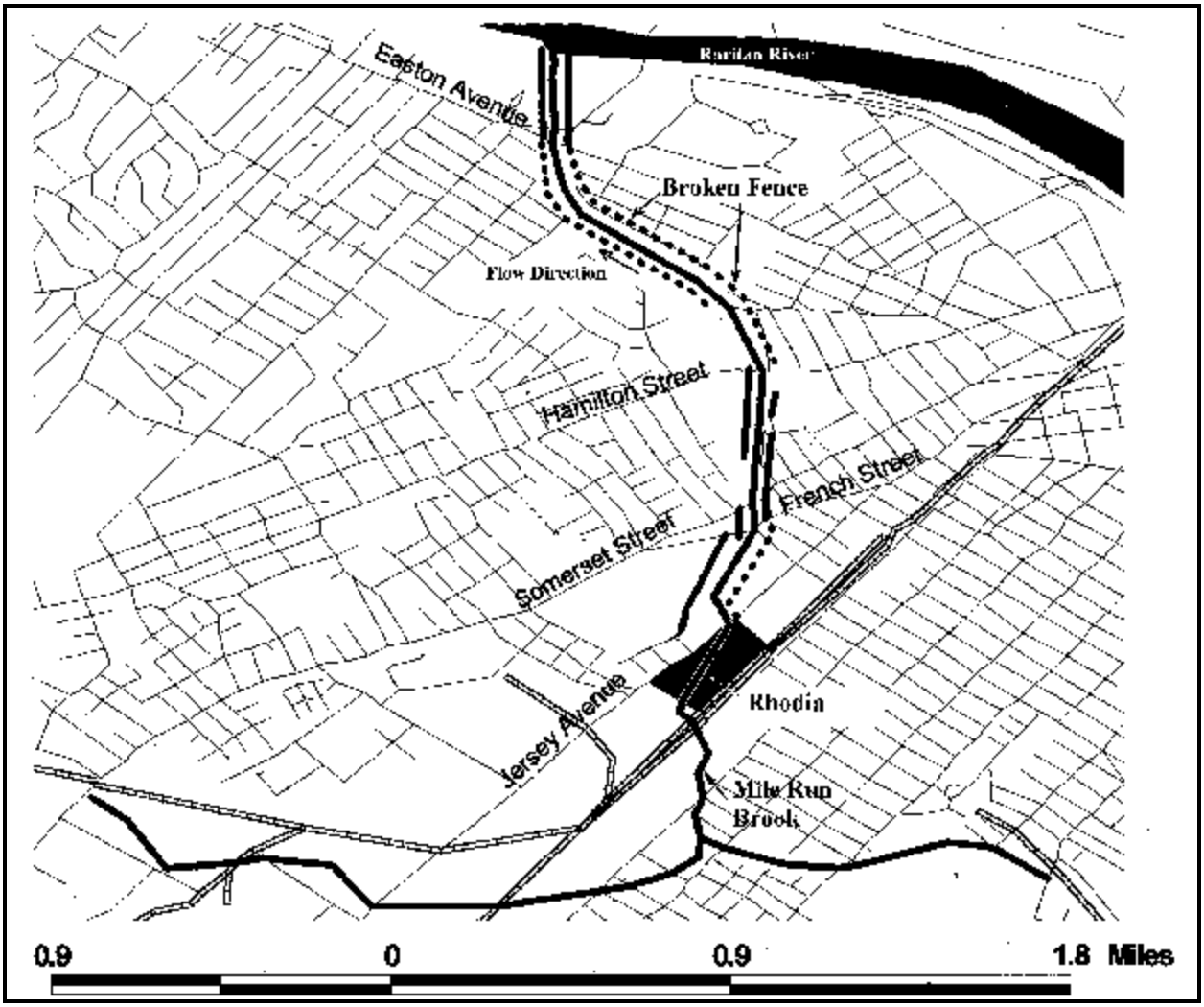


Figure 2 - Accessible areas of the Mile Run Brook.